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A COURSE OF STUDY IN NUMBER CONCEPTS TO BE TAUGHT
IN THE ARLINGTON KINDERGARTENS

Submitted by

Lawrence John Mantyla

(B.S. in Ed., Bridgewater State Teachers College)
1930

In partial fulfillment of requirements for
the degree of Master of Education

1948

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Service Paper

COURSE ON STUDY IN NUMBER CONCEPTS TO BE TAUGHT

IN THE ARMYINGTON ATTENDANCE

CERTIFICATE BOARD

Presented by

U-M-C-E

Lawrence John Smith

(L.S. is a., Bridgewater State Teachers College)
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Research in Number Readiness

When we speak of number readiness or children's ability to learn arithmetic in the kindergarten we discover that not too much has been done. However, some good work in this field has been done for grade one. Brownell¹ summarizes this evidence in three ways. "Evidence from first grade inventories, evidence from evaluation by testing, and evidence derived from control-group experiments."

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United States and covered from kindergarten through grade two. He concludes in part that "children possess much ability in the elementary processes of arithmetic even before the time of beginning formal instruction in the subject" and that "the knowledge possessed by children is not limited to counting and adding simple combinations, but includes elementary knowledge of fractions, United States money, units of various types of measurement, and the understanding of the processes demanded in simple verbal problems."

In her study with 266 children from the kindergarten, the first, the second, and the third grades of the Elementary School of the University of Chicago, Polkinghorne¹ reports in part: "It seems reasonable, too, that if primary children learn so much about fractions without systematic instruction of any sort, there can be no question about their ability to learn much more about fractions under direct teaching."

In any curriculum construction the precise determination of the part played by activities in the out-of-school life of the pupils in the first grade is important. Smith² lists her findings on the use of arithmetic as "Transactions carried on in stores 30%; games involving counting 18%; reading Roman numerals on clock 14%; reading Arabic numerals in finding

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pages in books 13%; dividing food with playmates and pets (fractions) 6%; depositing money in and drawing money from toy banks 5%; playing store 3%. These seven make up 83% of the entire list." In conclusion she says "there is great probability that they [results] approximate very closely the true facts concerning the general types of arithmetical experiences which first-grade children encounter in their daily out-of-school lives."

Writing on when to begin teaching arithmetic Buckingham¹ feels that,

we are confronted by two pertinent facts; first, that the child upon entering grade one is ready for arithmetic; and secondly, that he is already using it to serve his own purposes and will continue to do so independently of any action taken by the school. If the time to begin is when the child is ready and has use for the subject, then we should begin the teaching of arithmetic as soon as he comes to school.

MacLatchy², reporting on a survey by Mlle. Descoeudres, Beckman, and Mlle. Monchamps, summarizes,

all these authorities agree in presenting evidence that simple number facts may be understood by children at an early age that this knowledge steadily increases, and that there are individual variations in the depth of understanding held by different children at each age.

On a test given to 125 children ranging in ages from

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36 to 72 months McLaughlin¹ suggests

Growth in number ability at these immature ages within the limits of the study is very gradual and dependent upon many factors. Brightness is one such factor that strongly influences superior ability at each age level. Furthermore, progress is intimately interrelated and dependent upon mastery of more mature methods of dealing with number experience. These more mature methods are evolved as the child gets insight or understanding of the relational factors existing between numbers.

What do we know about number readiness, about children's ability to learn arithmetic? In a summary of an investigation made by Buckingham and MacLatchy² with 1,356 children, they found:

I. Rote Counting.

In counting by ones about 90 percent of the children succeeded at least as far as 10 and about 60 percent of them at least as far as 20. The typical (median) child counted to 27 to 28. One in eight of the children counted to 100. Half of the children counted by tens at least as far as 40, while one quarter of them counted in this manner to 100.

II. Counting with Objects.

The test used did not require counting of this type beyond 20. The majority of the children (in fact about 60 percent) "broke the test" by counting as far as they were permitted to go. Seventy-five percent counted at least as far as 14.

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²B. R. Buckingham and J. MacLatchy, "The Number Abilities of Children When They Enter Grade One," The Twenty-Ninth Year-book, National Society for the Study of Education, Public School Publishing Company, Bloomington, Illinois, Chap. IV, pp. 473-509.

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I. rote counting.

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III. Reproducing Numbers.

This is one of the writer's two tests of number concepts. Practically all the children "knew" the numbers from 1 to 4. Eighty-five percent of them reproduced 5 at least once out of three trials, and nearly two-thirds of them did so on all three trials. The numbers 6 and 7 were practically equal in difficulty. Fully 80 percent of the children reproduced them once and 55 percent three times. The number 8 was of substantially the same difficulty as the number 10. Over 75 percent of the children reproduced each of these numbers once, and about half of them did so three times.

IV. Naming Numbers.

This is somewhat more difficult as a test of number concepts than reproducing numbers, and the percent of children who succeeded are from 4 to 8 percentage points less. Yet even here the children did well. Forty-two percent of them succeeded every time on the hardest number, namely 10. An additional 28 percent of them showed that they were "on the way" to a reliable understanding of 10 by succeeding either once or twice. Thus a total of 70 percent responded correctly at least once on the hardest number of the series. The corresponding percent for 8 was 72; for 7, 74; for 6, 75; for 5, 81.

V. Combinations in Verbal Problems.

According to the Knight Behrens difficulty rankings, the addition combinations used in this test ranged from 11th to 81st. Some of the children gave correct answers to all the combinations--in fact 91 or 7 percent of them did so. Very nearly half the children got five combinations right and only 11 percent of them failed to get any right. The combinations ranged in difficulty for these children from 5 plus 1 which 71.5 percent of the children answered correctly, to 4 plus 5 which only 22 percent answered correctly.

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The ten addition combinations in this test ranked from 10th to 88th according to rankings of Knight and Behrens. Half of the children answered at least five of these combinations correctly when the objects were concealed. When the objects were visible, more than half the children answered all the combinations correctly. The 88th combination (6 plus 4) was the hardest for the children as was to be expected from its placement on the Knight-Behrens list. Yet this combination was answered correctly by nearly one-third of the children (31.8%) when the objects were concealed and by 40 percent more of them when the objects were uncovered.

Commenting on a similar investigation in the Cleveland Public Schools, Director of Research William L. Connor¹ says:

The amount of number used by little children, as revealed by this test, has proved to be a revelation to all of those connected with the teaching and supervision of little children in the Cleveland Schools. It seems not at all improbable that the fear that school officers seem to have had of crowding number concepts on little children too soon is wholly without foundation in fact.

When one considers the ordinary teaching materials in arithmetic in the light of these findings, fragmentary as they are, it would almost seem as if the course-of-study makers, textbook writers, and teachers of the last generation had conspired to retard by every means possible the natural growth of number concepts which takes place in little children from four to seven years of age.

In answer to the question--Should arithmetic be taught in the kindergarten and in grades one and two?--

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Sueltz¹ says:

Whether or not the school plans to teach arithmetic in these grades, the children will learn it. Even at the ages of two and three years, normal children are developing ideas of size, amount, and number and are making visual and mental, as well as manual comparisons. Similarly in the kindergarten concepts of size, of shape, of amount and of number are being developed in relation to the things which the children see and handle. These concepts and associations with them precede the stage when it becomes necessary to read and write figures. Opportunities for thinking and for exercise of judgment frequently occur in the kindergarten.

Speaking of the content of the arithmetic curriculum Thiele² points out, "In the strict sense of the word the number learning of five and six year old children cannot be separated from that which is acquired when the ages of seven, eight and nine are reached. Likewise the number knowledge of five and six year olds is a refinement of still earlier ideas regarding quantity."

As research shows, children have certain knowledge of number concepts even before entering the kindergarten, and as this knowledge varies, this paper will present certain concepts which may be developed in the kindergarten.

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CHAPTER II

PLAN OF THE STUDY

The kindergarten program was reintroduced into the Arlington public school system in September 1944 after a lapse of several years due to an economy measure.

The writer of this paper became interested in the activities and the purposeful play of the kindergarten with the idea of a planned program for directing, expanding, and extending a number readiness program.

After extensive reading of what research has been done on the subject, an attempt was made to develop a list of concepts which could be introduced during the kindergarten year.

Courses of study available at the Boston University Resources Library and the Boston Public Library and those of the towns and cities having kindergartens in the Metropolitan Boston area were examined.

It was found that in most cases the concept of number was generalized and combined into the area of the kindergarten and the first grade with no specific placement in the kindergarten. However, in some cities and towns, particularly Long Beach, California, San Diego, California,

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Akron, Ohio, New York, Boston, Massachusetts, and Philadelphia, Pennsylvania, specific goals are established for the kindergarten. Courses of study in Newton, Massachusetts, Springfield, Massachusetts, Chicago, Illinois, Tulsa, Oklahoma, Los Angeles, California, Belmont and Brookline, Massachusetts were very helpful in this study.

The following list of achievement goals or concepts in quantity, number order, size, location or position, comparison, time, money, weight and measure was compiled from the above sources and presented to the kindergarten teachers of the eight kindergartens in Arlington in the spring of 1945.

Proposed Work with Number in Kindergartens

Achievement goals.

To understand the beginning concepts of number, size, time, measures, and money.

Content

I Quantity

Know meaning of:

Many	Few
More	Lot

Counting concretely 1 to 25

II Number Order

Know meaning of:

Before	First	Fourth
After	Second	Last
Next	Third	

III Size

Know meaning of:

Great	Whole	Bigger than
Little	Half	Smaller than
Big	Tall	Less

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 time, measure, and money.

Content

I Quantity		Know meaning of:	
Many		Few	
More		Lot	
Counting concretely 1 to 25			
II Number Order		Know meaning of:	
Before		First	
After		Second	
Next		Third	
Fourth		Last	
III Size		Know meaning of:	
Great		Whole	
Little		Half	
Big		Tall	
Bigger than		Smaller than	
		Less	

IV	Location or position						
	Know meaning of:						
	Low	Up	Farthest	Above			
	Down	Far	Middle	Below			
	High	Close	Top	Next			
				Near			

V	Comparison						
	Know meaning of:						
	Wider	Closer	Last	Too			
	Faster	Nearer	Farthest	Bigger			
	Lighter	Slowly	Late	Most			

VI	Time						
	Know meaning of:						
	Tomorrow	Day	Afternoon	Days of the week			
	Week	Years	At once	Early			
	Today	Morning	Minutes	Late			
	Everyday	Noon	Yesterday	Quiet time (other similar uses)			

VII	Money						
	Know meaning of:						
	Penny	Nickel	Dime	Quarter			

VIII	Weight						
	Know meaning of:						
	Heavy	Light					

IX	Measures						
	Know meaning of:						
	Cup	Pint	Quart				

Each kindergarten teacher was asked to check each item in the list that she had developed or felt could be developed. The results of this investigation are presented in Table I.

Total Concepts.....72
 Unanimous Opinion.....43
 Difference of Opinion.....29

17 Concepts one dissenting opinion
 8 Concepts two dissenting opinions
 4 Concepts three dissenting opinions

IV	Location or position	Know meaning of:	High Down Low Up	Close Far Middle Farthest	Above Below Next Near
V	Comparison	Know meaning of:	Lighter Faster Wider	Slowly Nearer Closer	Most Bigger Too
VI	Time	Know meaning of:	Everyday Today Week Tomorrow	Noon Yesterday Morning Minutes Late Early Days of the week	Similar uses (other quiet time)
VII	Money	Know meaning of:	Penny Nickel	Dime	Quarter
VIII	Weight	Know meaning of:	Heavy Light		
IX	Measures	Know meaning of:	Cup Pint	Quart	

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Table I. Summary of the Opinions Expressed by Eight Kindergarten Teachers in Proposed Number Concepts.

Concept	Yes	No	Concept	Yes	No	Concept	Yes	No
Many.....	8	0	High.....	8	0	Week.....	8	0
More.....	8	0	Up.....	8	0	Today.....	8	0
Few.....	8	0	Far.....	7	1	Everyday....	6	2
Lot.....	6	2	Close.....	7	1	Day.....	8	0
Counting....	8	0	Farthest....	7	1	Years.....	6	2
Before.....	8	0	Middle.....	8	0	Morning.....	8	0
After.....	8	0	Top.....	8	0	Noon.....	7	1
Next.....	8	0	Above.....	8	0	Afternoon...	8	0
First.....	8	0	Below.....	8	0	At once.....	7	1
Second.....	8	0	Next.....	8	0	Minutes.....	6	2
Third.....	8	0	Near.....	6	2	Yesterday...	8	0
Fourth.....	8	0	Wider.....	5	3	Day of week.	8	0
Last.....	8	0	Faster.....	8	0	Early.....	8	0
Great.....	5	3	Lighter.....	7	1	Late.....	8	0
Little.....	8	0	Closer.....	7	1	Quiet time..	8	0
Big.....	8	0	Nearer.....	7	1	Penny.....	7	1
Whole.....	8	0	Slowly.....	8	0	Nickel.....	7	1
Half.....	8	0	Last.....	8	0	Dime.....	7	1
Tall.....	8	0	Farthest....	5	3	Quarter.....	7	1
Bigger than.	8	0	Late.....	7	1	Heavy.....	8	0
Smaller than	7	1	Too.....	5	3	Light.....	8	0
Less.....	6	2	Bigger.....	7	1	Cup.....	7	1
Low.....	8	0	Most.....	7	1	Pint.....	6	2
Down.....	8	0	Tomorrow....	8	0	Quart.....	6	2

Total Concepts.....72

Unanimous Opinion.....43

Difference of Opinion.....29

17 Concepts one dissenting opinion

8 Concepts two dissenting opinions

4 Concepts three dissenting opinions

Table I. Summary of the Opinions Expressed by Eight Kindergarten Teachers in Proposed Number Concepts.

Concept	Yes	No	Concept	Yes	No	Concept	Yes	No
Down.....	8	0	Tomorrow....	8	0	Quarter.....	8	2
Low.....	8	0	Most.....	7	1	Pint.....	8	2
Less.....	8	2	Bigger.....	7	1	Cup.....	7	1
Smaller than	7	1	Too.....	5	3	Light.....	8	0
Bigger than	8	0	Late.....	7	1	Heavy.....	8	0
Tall.....	8	0	Farthest....	5	3	Quarter.....	7	1
Half.....	8	0	Last.....	8	0	Dime.....	7	1
Whole.....	8	0	Slowly.....	8	0	Nickel.....	7	1
Big.....	8	0	Nearer.....	7	1	Penny.....	7	1
Little.....	8	0	Closer.....	7	1	Quiet time..	8	0
Great.....	5	3	Lighter.....	7	1	Late.....	8	0
Last.....	8	0	Faster.....	8	0	Early.....	8	0
Fourth.....	8	0	Wider.....	5	3	Day of week	8	0
Third.....	8	0	Near.....	5	3	Yesterday..	8	0
Second.....	8	0	Next.....	8	0	Minutes.....	5	3
First.....	8	0	Below.....	8	0	At once.....	7	1
Next.....	8	0	Above.....	8	0	Afternoon..	8	0
After.....	8	0	Top.....	8	0	Noon.....	7	1
Before.....	8	0	Middle.....	8	0	Morning.....	8	0
Counting....	8	0	Farthest....	7	1	Years.....	8	2
Lot.....	6	2	Close.....	7	1	Day.....	8	0
Few.....	8	0	Far.....	7	1	Everyday....	8	2
More.....	8	0	Up.....	8	0	Today.....	8	0
Many.....	8	0	High.....	8	0	Week.....	8	0

4 Concepts three dissimilar opinions
 8 Concepts two dissimilar opinions
 17 Concepts one dissimilar opinion
 Difference of opinion.....29
 Unanimous opinion.....43
 Total Concepts.....72

In the fall of 1945 a meeting was held of all the kindergarten teachers to discuss the opinions expressed the previous spring and to acquaint the new kindergarten teachers with the whole field of number concepts under consideration. It was decided by the group to carry on a program for a year working on the concepts.

The items where there was not a unanimity of opinion were discussed and it was decided to include them for a trial and meet again in the spring of 1946 to consider the results.

A meeting was held in May of 1946 to discuss whether there were any more items on which all were not agreed. It was found that opportunities had been presented during the year when each item on the suggested list was used. It was decided to use the list as a guide for the school year 1946-1947 and to note the activities in which the introduction of the various concepts were made. A list of these concepts would be forwarded to the writer at the end of the school year.

The following is a list compiled from these reports.

In the fall of 1945 a meeting was held of all the kindergarten teachers to discuss the opinions expressed the previous spring and to acquaint the new kindergarten teachers with the whole field of number concepts under consideration. It was decided by the group to carry on a program for a year working on the concepts.

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The following is a list compiled from these reports.

Suggested Activities in Which Number Concepts

Could Be Introduced

Morning Circle:

Different sized chairs

Little children--low chairs

Tall children--high chairs

Quantity

Number of children in the circle

Many--more--few--lot

Teacher and children count children present

Total--girls--boys

Time

Day of the week

What day is tomorrow?

Age of children

Morning--afternoon--noon

Late for school

Responsibilities:

Children give milk and cracker money to teacher on

Thursday

Name each coin

Penny--nickel--dime--quarter

Children name coins contributed to Red Cross Fund

Cutting napkins and paper towels for lunch

Halves--possibly quarters

Children mix paste--half cup--full cup

Children pass out milk bottles, straws, crackers,
and napkins and paper towels. Number needed--
number collected.

Milk distributed in half pints. Comparison with
home delivery--pints, quarts.

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Time
Late for school
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Age of children
What day is tomorrow?
Day of the week

Responsibilities:

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Name each coin
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and napkins and paper towels. Number needed--
number collected.
Milk distributed in half pints. Comparison with
home delivery--pints, quarts.

Games

Looby Loo--right, left, in, out
 Turn About--high, low, in, out
 The Mulberry Bush--days of the week
 The Merry-Go-Round--up, down around
 One Big Circle Marching Go--in, out, down, up
 Bluebird--through
 Musical Chairs--less
 Go In and Out the Windows--up, down
 Farmer in the Dell--Eight children play
 This Old Man--counting
 Point Your Little Toe--little
 Skip to My Lou--two
 Here We Go Around the Mountain Two by Two--two, up
 Red Leaves Falling Down--down, over
 Oats, Peas, and Beans--middle
 Up and Down--up, down
 I'm Very, Very Tall--tall, small
 Diddle, Diddle Dumpling My Son John--up, down
 Snail Game--first, last, nearer, farther
 Five Little Chickadees--counting
 One Elephant--counting to ten
 How Do You Do My Partner?--today
 Here We Come Walking Down the Street--today, down
 Three Little Maids--three
 Little Sally Waters--position
 Dance So Merrily--one
 As I Was Walking Down the Street--little, down
 Ring Toss--number
 Knocking at My Door--counting
 Block Relay--first, second, third, fourth
 Hide and Go Seek--counting
 Riddles--comparison

Games

Riddles--comparison
 Hide and Go Seek--counting
 Block Relay--first, second, third, fourth
 Knocking at my Door--counting
 Ring Toss--number
 As I Was Walking Down the Street--little, down
 Dance So Merrily--one
 Little Sally Waters--position
 Three Little Maids--three
 Here We Come Walking Down the Street--today, down
 How Do You Do My Partner?--today
 One Elephant--counting to ten
 Five Little Chickadees--counting
 Small Game--first, last, nearer, farther
 Tiddle, Diddle Dangling My Son John--up, down
 I'm Very, Very Tall--tall, small
 Up and Down--up, down
 Cats, Paws, and Beans--middle
 Red Leaves Falling Down--down, over
 Here We Go Around the Mountain Two by Two--two, up
 Skip to My Lou--two
 Point Your Little Toe--little
 This Old Man--counting
 Farmer in the Dell--Right children play
 Go In and Out the Windows--up, down
 Musical Chairs--less
 Blindfold--through
 One Big Circle Marching Go--in, out, down, up
 The Merry-Go-Round--up, down around
 The Mulberry Bush--days of the week
 Turn About--high, low, in, out
 Looey Loo--right, left, in, out

Songs

Chimney and a Star--far, close --faster, slowly, lighter
 Two Little Blackbirds--two little
 Ten Little Indians--counting little, tall, bigger than
 The Pigs--three, big, today, little, down
 Three Little Drums--counting middle
 Here's A Ball For Baby--big after
 I Saw Three Ships Sailing--three
 Coasting--down of steps
 The Merry Go Round--up, down ar
 In the Apple Tree--high
 My Pony--slowly
 The Star and the Moon--little, down, big
 The Milkman--early
 Nickel and Dime--nickel and dime
 Sing Bluebird Sing!--four and long steps
 Dandelions--first
 Pussy Willow--early
 Twinkle, Twinkle Little Star--up, above, high
 Snowflakes--little
 Hot Cross Buns--one, two big, bigger than, smaller than,
 Birthday Song--counting
 Big, Tall Indian--size --big, little
 Wee Willie Winkie--up, down 1, little
 Stairs--up, down
 Rumblekins Are Gay--day, night ar, close
 Come Little Leaves--down, one
 Witches--tall, big
 I Haven't A Penny--two, penny, dime
 Elevator Man--up, down, first, second, third, fourth
 O'clock in the Kitchen--little, tall ar
 The Aeroplane--high, up notes, early, late
 Pretty Bunny--big, long
 Here is Sunshine--high, low
 Robin, Robin Sing to Me--high, up
 Little and Dimple were Twins--counting, pairs
 A Penny For Candy--penny
 Antecedent Numbers--counting
 The Ants of Farmer Jones--size, number, time
 Anybody at Home--size, number
 Chicken Little--counting
 The Story of Collette--number
 Where's My Penny?--size
 The Night Before Christmas--number
 Little Nipper--size
 Super Super Tella Vira--time

Songs

Chimney and a Star--far, close
 Two little Blackbirds--two
 Ten little Indians--counting
 The Pigs--three, big, today, little
 Three little Dicks--counting
 Here's a Ball for Baby--big
 I Saw Three Ships Sailing--three
 Coasting--down
 The Merry Go Round--up, down
 In the Apple Tree--high
 My Pony--slowly
 The Star and the Moon--little, down, big
 The Milkman--early
 Nickel and Dime--nickel and dime
 Sing Birdie Sing!--four
 Landladies--first
 Prissy Willow--early
 Tinkle, Tinkle little Star--up, above, high
 Snowflakes--little
 Hot Cross Buns--one, two
 Birthday Song--counting
 Big, Tall Indian--size
 Wee Willie Winkles--up, down
 Stars--up, down
 Rumples Are Gay--day, night
 Come little Leaves--down, one
 Witches--tall, big
 I Haven't a Penny--two, penny, dime
 Elevator Man--up, down, first, second, third, fourth
 O'clock in the Kitchen--little, tall
 The Aeroplane--high, up
 Pretty Bunny--big, long
 Here is Sunshine--high, low
 Robin, Robin Sing to Me--high, up

The Child's Almanac--day, week The Greedy Pig--counting The Hurling Holla--number

Rhythms

Clapping hands and tapping feet--faster, slowly, lighter
 High Stepping Horses--big, little
 Giant Steps--great, big, little, tall, bigger than
 Skipping--faster, slowly, high, low, down
 Falling Leaves--high, top, up, middle
 Gallop--two by two, before, after
 Jumping--number of jumps
 Walking--number of steps
 Aeroplane--high, low, far, near
 Skating--two by two
 Seesaw--up, down
 Swing--number
 Music--counting rhythm first, second, third, fourth, last
 Dance--counting steps and slides
 Marching--counting soft and loud steps

Here's A Little Ball--little, bigger, big, number Here's A Ball for Baby

Stories

The Three Bears--great, big, bigger than, smaller than, middle
 Three Billy Goats Gruff--big, little
 Three Little Pigs--big, small, little
 Millions of Cats--many
 Pokey Little Puppy--down, up, far, close
 Bobby Had a Nickel--nickel
 I Had a Penny--penny
 Make Way for the Ducklings--counting
 Cinder--number order
 Gingerbread Boy--faster, lighter, nearer
 Ping--today, morning, minutes, early, late
 The Blue Dishes--penny
 The Seven Cats--counting
 Jon and Jean are Six--counting
 Bobbie and Dommie Were Twins--counting, pairs
 A Penny for Candy--penny
 Animated Numbers--counting
 The Animals of Farmer Jones--size, number, time
 Anybody at Home--size, number
 Chicken Little--counting
 The Story of Collette--number
 Where's My Baby?--size
 The Night Before Christmas--number
 Little Hippo--size
 Mother Goose Tells Time--time

Rhythms

Clapping hands and tapping feet--faster, slowly, lighter
 High Stepping Horses--big, little
 Giant Steps--great, big, little, tall, bigger than
 Skipping--faster, slowly, high, low, down
 Pulling leaves--high, top, up, middle
 Gallop--two by two, before, after
 Jumping--number of jumps
 Walking--number of steps
 Aerobics--high, low, far, near
 Skating--two by two
 Seesaw--up, down
 Swing--number
 Music--counting rhythm
 Dance--counting steps and slides
 Marching--counting soft and loud steps

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 Ping--today, morning, minutes, early, late
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 A Penny for Candy--penny
 Animated Numbers--counting
 The Animals of Farmer Jones--size, number, time
 Anybody at Home--size, number
 Chicken Little--counting
 The Story of Collette--number
 Where's My Baby--size
 The Night Before Christmas--number
 Little Hippo--size
 Mother Goose Tells Time--time

The Child's Almanac--day, week
 The Greedy Pig--counting pennies
 The Restless Robin--number
 The Country Bunny--number
 The Tale of Easter--time
 The Golden Egg--size
 Peter Rabbit--number
 Little Black Sambo--number
 The Little Gardeners--number, time

Poems

Five Little Squirrels	}	first, second, third, fourth, last
Five Little Ducks		
Five Little Bunnies		
Five Little Mice		
Five Little Ants		

Here's A Little Ball--little, bigger, big, number
 Here's A Ball for Baby--big
 Tom Thumb--size
 Simple Simon--penny
 When I was One--counting
 Three Wise Men of Gotham--counting
 Choosing Shoes--counting
 The Cat Counting--counting, up, down, high
 A Neat Little Clock--little, time
 The Tall Clock in the Hall--tall
 The Balloon Man--big, small, high, low
 The Barbers--down, close, top
 Rabbits--up, down
 Trains--number
 Foreign Lands--up, down, higher, farther
 The Swing--up, down
 Twenty Foolish Fairies--number

The Child's Almanac--day, week
 The Greedy Pig--counting pennies
 The Restless Robin--number
 The Country Bunny--number
 The Tale of Easter--time
 The Golden Egg--size
 Peter Rabbit--number
 Little Black Sambo--number
 The Little Gardeners--number, time

Poems

Five Little Ants
 Five Little Mice
 Five Little Bunnies
 Five Little Ducks
 Five Little Squirrels
 } first, second, third, fourth, last

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 Simple Simon--genny
 When I was One--counting
 Three Wise Men of Gotham--counting
 Choosing Shoes--counting
 The Cat Counting--counting, up, down, high
 A Nest Little Clock--little, time
 The Tall Clock in the Hall--tall
 The Balloon Man--big, small, high, low
 The Barbers--down, close, top
 Rabbits--up, down
 Trains--number
 Foreign Lands--up, down, higher, farther
 The Swing--up, down
 Twenty Polish Fairies--number

Seatwork

Stringing beads--number, number order
 Peg boards--quantity, number of pegs
 Blocks--size and position
 Paper--number, size, folding for size
 Cutting or use of scissors--size
 Parquetry--form, size
 Plasticine--form, size

With proper construction, suitable content, and wise administration, a course of study can be a directing force and an inspiration to teachers. A truly functional course of study is an achievement in any school system. It should not thwart a teacher's efforts at good judgment.

It is necessary for the teacher to help the children develop clear concepts of elementary arithmetic. The teacher must also realize that effective teaching must be adjusted to the needs of the pupils.

Both pupil and teacher need a clear, unified view of each process, and the teacher should be resourceful in adapting the work to children.

Furthermore there may be much incidental teaching before a process is taken up for systematic mastery, or the incidental work may extend beyond mastery requirements. This is frequently illustrated in a teacher's treatment of fractions. Systematic treatment is scheduled for the sixth grade, and is limited to the few that are useful. However, fractions come easily and naturally into the experience of the child

Sewwork

Strapping beads--number, number order
 Peg boards--quantity, number of pegs
 Blocks--size and position
 Paper--number, size, folding for size
 Cutting or use of scissors--size
 Parquetry--form, size
 Plasticine--form, size

CHAPTER III

KINDERGARTEN COURSE OF STUDY IN NUMBER CONCEPTS

Philosophy on Courses of Study in Arithmetic

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in the kindergarten. In activities throughout the early grades, there may be and should be uses for fractions. The wise teacher capitalizes on these needs.

The total effect of a simplified, functional program is confidence, success, and a liking for arithmetic. The essentials will be mastered and the child will know where to go for help in little-used processes, without being depressed by impossible requirements for mastery.

Work with Number in the Kindergarten

Since the out-of-school learning has been the outgrowth of the normal, everyday, pleasurable experiences in which number is incidental, it seems reasonable to continue such experiences as a basis for further learning in school. The role of the teacher is to see that the activities in which the child is engaged are of such a nature that he is growing in his ability to cope with his own problems.

The administration of this course of study must necessarily be in the hands of each teacher with full authority to make all adaptations necessary.

Suggestions and Comments

Activities have been selected because of their general value to pupils, not solely because of the opportunity they offer for number concepts.

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Suggestions and Comments

Activities have been selected because of their general value to pupils, not solely because of the opportunity they offer for number concepts.

Kindergarten experience lends itself readily for the introduction of certain concepts of number and this experience should have certain goals in mind.

Children differ in native intelligence, in home instruction, and in opportunities. There is little the teacher can do about differences in native intelligence but she can equalize the amount of instruction and even up the environmental opportunities.

Pupils sometimes gain wrong impressions and begin to acquire habits which are objectionable. They talk about the "littlest" half and the "biggest" half.

While for the child the instruction in number should appear incidental it should be definite in the mind of the teacher.

Pupils will make greater progress with good teaching than without it, even though they may acquire considerable information and skill if left to their own devices.

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Work with Number in the Kindergartens

Achievement goals.

To understand the beginning concepts of number, size, time, measures, and money.

Content

I Quantity

Know meaning of:

Many Few

More Lot

Counting concretely 1 to 25

II Number Order

Know meaning of:

Before First Fourth

After Second Last

Next Third

III Size

Know meaning of:

Great Whole Bigger than

Little Half Smaller than

Big Tall Less

IV Location or position

Know meaning of:

Low Up Farthest Above

Down Far Middle Below

High Close Top Next

Near

V Comparison

Know meaning of:

Wider Closer Last Too

Faster Nearer Farthest Bigger

Lighter Slowly Late Most

VI Time

Know meaning of:

Tomorrow Day Afternoon Days of the

Week Years At once week

Today Morning Minutes Early

Everyday Noon Yesterday Late

Quiet time

(other similar uses)

Work with number in the kindergarten

Achievement Goals.

To understand the beginning concepts of number, size, time, measures, and money.

Content

I	Quantity	Know meaning of:	Many Few More Less Counting concretely 1 to 25
II	Number Order	Know meaning of:	First Second Third Fourth Last
III	Size	Know meaning of:	Great Little Big Whole Half Smaller than Bigger than Less
IV	Location or position	Know meaning of:	Up Down Close Far Middle Farthest Above Below Next Near
V	Comparison	Know meaning of:	Wider Narrower Faster Slower Closer Farther Last First Bigger Smaller More Less
VI	Time	Know meaning of:	Tomorrow Today Yesterday Next Last First Morning Afternoon Evening Night Week Month Year Season Day Night Quiet time (other times for uses)

VII Money
 Know meaning of:
 Penny Nickel Dime Quarter

VIII Weight
 Know meaning of:
 Heavy Light

IX Measures
 Know meaning of:
 Cup Pint Quart

Suggested Activities in Which Number Concepts Could Be Introduced

Morning Circle:

Different sized chairs
 Little children--low chairs
 Tall children--high chairs

Quantity
 Number of children in the circle
 Many--more--few--lot
 Teacher and children count children present
 Total--girls--boys

Time
 Day of the week
 What day is tomorrow?
 Age of children
 Morning--afternoon--noon
Late for school

Responsibilities:

Children give milk and cracker money to teacher on
 Thursday.

Name each coin.

Penny--nickel--dime--quarter

Children name coins contributed to Red Cross Fund.

Cutting napkins and paper towels for lunch.

Halves--possibly quarters.

Children mix paste--half cup--full cup.

Children pass out milk bottles, straws, crackers, and
 napkins and paper towels. Number needed--number
 collected.

Milk distributed in half pints. Comparison with home
 delivery--pints, quarts.

VII Money Know meaning of: Penny Nickel Dime Quarter

VIII Weight Know meaning of: Heavy Light

IX Measures Know meaning of: Cup Pint Quart

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Games

Looby Loo--right, left, in, out
 Turn About--high, low, in, out
 The Mulberry Bush--days of the week
 The Merry-Go-Round--up, down, around
 One Big Circle Marching Go--in, out, down, up
 Bluebird--through
 Musical Chairs--less
 Go In and Out the Windows--up, down
 Farmer in the Dell--eight children play
 This Old Man--counting
 Point Your Little Toe--little
 Skip to My Lou--two
 Here We Go Around the Mountain Two by Two--two, up
 Red Leaves Falling Down--down, over
 Oats, Peas, and Beans--middle
 Up and Down--up, down
 I'm Very, Very Tall--tall, small
 Diddle, Diddle Dumpling My Son John--up, down
 Snail Game--first, last, nearer, farther
 Five Little Chickadees--counting
 One Elephant--counting to ten
 How Do You Do My Partner?--today
 Here We Come Walking Down the Street--today, down
 Three Little Maids--three
 Little Sally Waters--position
 Dance So Merrily--one
 As I Was Walking Down the Street--little, down
 Ring Toss--number
 Knocking at My Door--counting
 Block Relay--first, second, third, fourth
 Hide and Go Seek--counting
 Riddles--comparison

Games

Riddle--comparison
 Hide and Go Seek--counting
 Block Relay--first, second, third, fourth
 Knocking at My Door--counting
 Ring Toss--number
 As I Was Walking Down the Street--little, down
 Dance So Merrily--one
 Little Sally Waters--position
 Three Little Maids--three
 Here We Come Walking Down the Street--today, down
 How Do You Do My Partner--today
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 Five Little Chickadees--counting
 Shall Game--first, last, nearer, farther
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 I'm Very, Very Tall--tall, small
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 Go In and Out the Windows--up, down
 Musical Chairs--less
 Bluebird--through
 One Big Circle Marching Go--in, out, down, up
 The Merry-Go-Round--up, down, around
 The Merry-Go-Round--days of the week
 Turn About--high, low, in, out
 Loopy Do--right, left, in, out

Songs

Chimney and a Star--far, close
 Two Little Blackbirds--two
 Ten Little Indians--counting
 The Pigs--three, big, today, little
 Three Little Drums--counting
 Here's A Ball for Baby--big
 I Saw Three Ships Sailing--three
 Coasting--down
 The Merry Go Round--up, down
 In the Apple Tree--high
 My Pony--slowly
 The Star and the Moon--little, down, big
 The Milkman--early
 Nickel and Dime--nickel and dime
 Sing Bluebird Sing!--four
 Dandelions--first
 Pussy Willow--early
 Twinkle, Twinkle Little Star--up, above, high
 Snowflakes--little
 Hot Cross Buns--one, two
 Birthday Song--counting
 Big, Tall Indian--size
 Wee, Willie Winkie--up, down
 Stairs--up, down
 Rumplekins Are Gay--day, night
 Come Little Leaves--down, one
 Witches--tall, big
 I Haven't A Penny--two, penny, dime
 Elevator Man--up, down, first, second, third, fourth
 O'clock in the Kitchen--little, tall
 The Aeroplane--high, up
 Pretty Bunny--big, long
 Here is Sunshine--high, low
 Robin, Robin sing to Me--high, up

Songs

Robin and a Hen--up, alone
 Two Little Blackbirds--two
 Ten Little Indians--counting
 The Star--three, big, body, little
 Three Little Orms--counting
 Here's a Ball for Baby--big
 I See Three Ships Sailing--three
 Coasting--down
 The Merry-go-round--up, down
 In the Apple Tree--high
 My Lamp--slowly
 The Star and the Moon--little, down, big
 The Mitten--early
 Michael and Linda--nickel and dime
 Sing Sweetly Along--low
 Dandelions--first
 Pretty Willow--early
 Twinkle, Twinkle Little Star--up, above, high
 Snowflakes--little
 Hot Cross Buns--one, two
 Birthday Song--counting
 Big, Tall Indian--size
 Was, Willie Winks--up, down
 Stairs--up, down
 Humptykins are Gay--day, night
 Come Little Leaves--down, one
 Witches--fall, big
 I Haven't a Penny--two, penny, dime
 Elevator Man--up, down, first, second, third, fourth
 O'clock in the Kitchen--little, fall
 The Aeroplane--high, up
 Pretty Bunny--big, long
 Here is Sunshine--high, low
 Robin, Robin sing to me--high, up

Rhythms

Clapping hands and tapping feet--faster, slowly, lighter
 High Stepping Horses--big, little
 Giant Steps--great, big, little, tall, bigger than
 Skipping--faster, slowly, high, low, down
 Falling leaves--high, top, up, middle
 Balloons--two by two, before, after
 Jumping--number of jumps
 Walking--number of steps
 Aeroplanes--high, low, far, near
 Skating--two by two
 Seesaw--up, down
 Swing--number
 Music--counting rhythm
 Dance--counting steps and slides
 Marching--counting soft and loud steps

Stories

The Three Bears--great, big, bigger than, smaller than
 Three Billy Goats Gruff--big, little
 Three Little Pigs--big, small, little
 Millions of Cats--many
 Pooky Little Puggy--down, up, far, close
 Bobby had a Nickel--nickel
 I had a Penny--penny
 Make way for the Ducklings--counting
 Cinder--number order
 Gingerbread Boy--faster, lighter, nearer
 Ring--today, morning, minutes, early, late
 The Blue Dishes--penny
 The Seven Cats--counting
 Jon and Jean are Six--counting
 Bobbie and Donnie were Twins--counting, pairs
 A Penny for Gandy--penny
 Animated Numbers--counting
 The Animals of Farmer Jones--size, number, time
 Anybody at Home--size, number
 Chicken Little--counting
 The Story of Collette--number
 There's My Baby--size
 The Night Before Christmas--number
 Little Hippo--size
 Mother Goose Tells Time--time
 The Child's Almanac--day, week

The Greedy Pig--counting pennies
 The Restless Robin--number
 The Country Bunny--number
 The Tale of Easter--time
 The Golden Egg--size
 Peter Rabbit--number
 Little Black Sambo--number
 The Little Gardeners--number, time

Poems

Five Little Squirrels	}	first, second, third, fourth, last
Five Little Ducks		
Five Little Bunnies		
Five Little Mice		
Five Little Ants		

Here's A Little Ball--little, bigger, big, number
 Here's A Ball for Baby--big
 Tom Thumb--size
 Simple Simon--penny
 When I Was One--counting
 Three Wise Men of Gotham--counting
 Choosing Shoes--counting
 The Cat Counting--counting, up, down, high
 A Neat Little Clock--little, time
 The Tall Clock in the Hall--tall
 The Balloon Man--big, small, high, low
 The Barbers--down, close, top
 Rabbits--up, down
 Trains--number
 Foreign Lands--up, down, higher, farther
 The Swing--up, down
 Twenty Foolish Fairies--number

Seatwork

Stringing beads--number, number order
 Peg boards--quantity, number of pegs
 Blocks--size and position
 Paper--number, size, folding for size
 Cutting or use of scissors--size
 Parquetry--form, size
 Plasticine--form, size

The Greedy Pig--counting pennies
 The Restless Robin--number
 The Country Bunny--number
 The Tale of Easter-time
 The Golden Egg--size
 Peter Rabbit--number
 Little Black Sambo--number
 The Little Gardeners--number, time

Poems

Five Little Ants
 Five Little Mice
 Five Little Bunnies
 Five Little Ducks
 Five Little Squirrels
 } first, second, third, fourth, last

Here's A Little Ball--little, bigger, big, number
 Here's A Ball for Baby--big
 Tom Thumb--size
 Simple Simon--penny
 When I Was One--counting
 Three Wise Men of Gotham--counting
 Choosing Shoes--counting
 The Cat Counting--counting, up, down, high
 A Nest Little Clock--little, time
 The Tall Clock in the Bell--tall
 The Balloon Man--big, small, high, low
 The Barbers--down, close, top
 Rabbits--up, down
 Trains--number
 Foreign Lands--up, down, higher, farther
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 Twenty Foolish Fairies--number

Seetwork

Stringing beads--number, number order
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